Mining Technology Group Newsletter

Spring 2024

Chairman's Chat

As we enter the joys of Spring, may I welcome you to our first edition of the Mining Technology Group (MTG) newsletter in 2024.

I must start with the exciting news that we have just recently completed the review and selection of a venue and dates for the MTG 2025 conference 'Advances in Mining Technology and Mineral Supply'. The event will be held at IET Austin Court, Birmingham on 19-20 March 2025. I am particularly pleased by being able to take an MTG event to a different location, one that will help to deliver value for IOM3, members and delegates, is easily accessible from most parts of the UK and is in a position to help spread the word about mining to a wider catchment in a major UK city. The venue has an intimate but professional feel, typified by the impressive Kingston Lecture Theatre. More details can be found on page 15.

Also for this edition we have more of a focus on mining technologies adopted and innovated in operational settings. First, we have a serialised article about the significant and influential contribution of the Dowty Mining company to the mining sector. The article will be spread across several MTG newsletters, commencing with an historical introduction to early health and safety in mines and the push for improvement. Later parts of the series will describe the growth of Dowty from its origins as an aircraft component manufacturer into the development of supports for underground mines and close with an account of the man responsible for such success, Sir George Dowty. We are very grateful to the Sir George Dowty Memorial Committee for granting permission to reproduce this fascinating series. Next, two of our leadership team members Neil Battison and Andy Birtles have reviewed the development of mine hazard monitoring and performance management technologies, citing examples of current practice from coal mines in Poland.

Later In the newsletter, Mine Tech Services provides a commendable example of how the consultancy not only applies technology to mine operations but also develops it by the use of transferable skills and employment from IT and other sectors. Such an approach was advocated in the IOM3 response on skills gaps when consulted by the UK government and Critical Minerals Intelligence Centre during 2023. The company also supports students and practices professional development and training for graduates in the drive to generate future interest in the mining professions. This article has been positioned within our now well-established 'Mining Education Matters' section to dovetail nicely with an education and training update provided by our very own Darron Dixon-Hardy. In a similar vein Daniel Smith of the University of Leicester introduces the Centre for Training and Research Group for Energy Transition Mineral Resources (TARGET).

Other sections of the newsletter comprise an extended section on PERC news and our more regular features of mining news and a calendar of mining-related IOM3 local society events during early 2024.

For those of you interested in ground engineering applications we have an inspirational update from our Ground Engineering Subgroup. The committee has made significant progress within only three years from inception and hold future ambitions to grow and become a greater part of the IOM3 technical communities. This topic brings me on to the MTG leadership team Itself. We are still actively seeking IOM3 member volunteers to join the Leadership Team. We would welcome members at any stages in their careers, particularly early-mid career and those who can bring new ideas and, just as important, be prepared to get involved and make things happen. For more information, see inside or make direct contact with me by email to our dedicated email address mtg@iom3.org.

Stop Press

MTG appointment to IOM3 Nominations Committee

The MTG is very pleased to announce that Dr Darron Dixon-Hardy, who recently joined the newsletter editorial team, has been appointed as a member of the IOM3 Nominations Committee on a four-year term. The Nominations Committee leads the process for appointments to the IOM3 Executive Board, Institute Officers and Chairs of Primary Boards. Darron is Deputy Head of the School of Chemical and Process Engineering, University of Leeds, member of the IOM3 MTG Leadership Team and NE Regional Representative on the IOM3 Advisory Council.

New MTG Leadership Team members required

The MTG is looking for IOM3 members who have affiliated with the MTG to volunteer for joining the Leadership Team. This is an opportunity to have a say in your sector and in the overall functioning of IOM3. See page 12 for more details.

MTG 2025: Advances in Mining Technology & Mineral Supply

Breaking News! - The MTG 2025 conference to be held in Birmingham, 19-20 March 2025. See p.15.

Scholarships available at Camborne School of Mines

Six £5,000 scholarships for exceptional students enrolling in 2024 on a mining or geology related course, supported by the CSM Trust. See the University of Exeter website for more details. Application deadline was 26 April 2024.

Upcoming events

MIMinE Annual Safety Seminar 2024

The Midland Institute of Mining Engineers will be holding its 17th Annual Safety Seminar entitled 'Safely Managing the Challenge of Change' on Friday 12 April 2024 at the Crowne Plaza, Sheffield.

UK Mining Conference in Cornwall 2024

The organisers have decided to move this year's event to June instead of the usual month of September. The two-day event will be held on 12 and 13 June 2024 at the Princess Pavilion in Falmouth, Cornwall. More details can be found on the ABMEC website.

ABMEC Conference 2024

This two-day conference will be held at the DoubleTree by Hilton Oxford Belfry, Thame, Oxford, UK.

Start Date: 27 November 2024. More details can be found on the ABMEC website.

Mines and Money @ Resourcing Tomorrow 2024

This conference, claimed to be 'Europe's largest mining event', is to again encompass three themes, Resourcing Tomorrow, Technology and Innovation and Mines and Money, 3 to 5 December 2024 at The Business Design Centre, London, UK.

Editorial team

Colin Comberbach, Andy Birtles, Darron Dixon-Hardy

IOM3 contact - David Arthur (david.arthur@iom3.org)

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Newsletter contents

News and Views

MTG Leadership

Update on Woodhouse Colliery

Source: A N Birtles

Since the award of planning permission in late 2022 West Cumbria Mining (WCM) has been working through 2023 preparing for construction commencement during 2024. A wide range of activities have been progressed, and although these may not be visible on site at this time, are critical in ensuring the project is ready and set up to make the next key step to commence site enabling works and for the main decline tunnel drives to proceed.

WCM and its investors remain highly confident in the viability of the project, which (*WCM claim*) is stronger than ever. For example, recent independent expert analysis of the global metallurgical coal market has identified that this critical raw material will be required to support steelmaking throughout the transition to 'net zero' over the next few decades.

This article was taken directly from the WCM website, where more information can be found.

Update on lithium projects

On 12 February 2024 Northern Lithium Ltd announced a new exclusive Mineral Rights Agreement with the Church Commissioners for England to extend the term and boundaries of the initial rights granted in 2021. The new mineral rights relate to the development and extraction of lithium and other minerals from saline-brines within the Northern Pennine Orefield, County Durham. Full details available on the Northern Lithium website.

This year Imerys British Lithium has set up a series of events to allow public consultation and viewing of the company's plans for a full-scale lithium processing plant on land previously used for clay extraction in Cornwall. The events have been scheduled for villages and towns such as Roche, Bugle, Trewoon, Penwithick, St Austell, Treverbyn, St Dennis, St Stephen and Fraddon. For more information, email bl.info@imerys.com.

Tailings dam issues

Source: A N Birtles

A Brazilian judge has recently ruled that mining companies Vale and BHP and their joint venture Samarco must pay approximately £7 billion in damages for the 2015 Fundão tailings dam failure in Mariana. The failure killed 19 people and polluted the Rio Doce, compromising the waterway to the Atlantic Ocean.

Other dam failures have resulted in law suits, which have also resulted in significant penalties and investigations into processes and procedures around the inspection and construction of tailings dams.

Despite these more stringent processes, dams are still failing (e.g. Jagersfontein in 2022).

Interested readers are pointed to the SME's Tailings Management Handbook, The Global Industry Standard on Tailings Management (GISTM), The International Commission of Large Dams (ICOLD), the Mining Association of Canada (MAC), The Australian National Committee on Large Dams Incorporated (ANCOLD Inc).

The contribution of Dowty to the world of mining

John Whitaker

This will be a regular feature for the Newsletters this year. John Whitaker[1] has kindly written an article outlining the history of the Dowty company, and their innovative approach to mining. He has included two additional articles from persons active in the industry at the time of the development of these innovations, which will be included in the final article. MTG is grateful to Martin Robins, Chairman of the Sir George Dowty Memorial Committee, for permission to publish the article.

Introduction

From the dawn of human civilisation, primitive man began seeking out food; water; clothing and shelter in order to survive and live. The needs of these first hunter gatherers were extremely simple when compared to modern day standards.

Early Mining and Safety

As the first populations expanded, along with a desire to move out of caves and to live in new locations, the need to construct weatherproof shelters developed. Tools for cutting and chopping, materials to make cooking pots and storage utensils were also needed as early farming, cookery, pottery and metal working practices developed. So began the need to mine and the utilisation of the world's mineral resources. The first record of coal mining is around 20,000 years ago, in South Africa. The Book of Job, thought to be one of the earliest books of the bible to be written, includes a vivid description of mining and primary extraction industries.

'There is a mine for silver and a place where gold is refined. Iron is taken from the earth, and copper is smelted from ore. Mortals put an end to the darkness; they search out the farthest recesses for ore in the blackest darkness. Far from human dwellings they cut a shaft, in places untouched by human feet; far from other people they dangle and sway. The earth, from which food comes, is transformed below as by fire; lapis lazuli comes from its rocks, and its dust contains nuggets of gold. No bird of prey knows that hidden path, no falcon's eye has seen it. Proud beasts do not set foot on it, and no lion prowls there. People assault the flinty rock with their hands and lay bare the roots of the mountains. They tunnel through the rock; their eyes see all its treasures'. Job 28:1-2[2]

Figure 1 *Source: Dowty*

Of course, mining has moved considerably on since then and throughout the world today rocks and materials such as coal, oil shale, gemstones, limestone, chalk, rock salt, potash, gravel and clay are mined and extracted in large quantities every day. A wide variety of metals and minerals are also mined including lead, zinc, nickel, copper, aluminium, manganese, tin, molybdenum, cobalt, lithium, tungsten, vanadium, cadmium, tantalum and other precious jewels and metals such as diamonds, silver, gold and platinum. Early tin mining in Cornwall, is shown in ***Figure 1.***

These various rocks, minerals and elements give us the wherewithal to produce the necessities and luxuries society now takes for granted. From cars to dishwashers, mobile phones to roads, heat and light to baked bean tins, engagement rings to garden patios and so much more besides.

[1] *Grandson of the first Dowty Group Chairman, A.W. Martyn, and author of the book 'The Best' detailing the definitive history of H.H. Martyn. Whitaker also authored a paper recording the significant contribution made by the Dowty Group to winning the Battle of Britain during WWII.*

[2] *The Holy Bible, New International Version® NIV® Copyright ©1973 1978 1984 2011 by Biblica, Inc.TM*

From its beginning, mining was an extremely dangerous occupation! Dangers were many and varied and presented themselves as toxic and explosive gasses, rapidly rising water levels and roof falls and collapses, ranging from the catastrophic to single rocks being dislodged which could kill or injure a man. The way we live today surrounded by luxuries and necessities has come at a massive cost - the cost of miners' lives. **Figure 2** illustrates a fraction of that cost, and just in the United States alone.

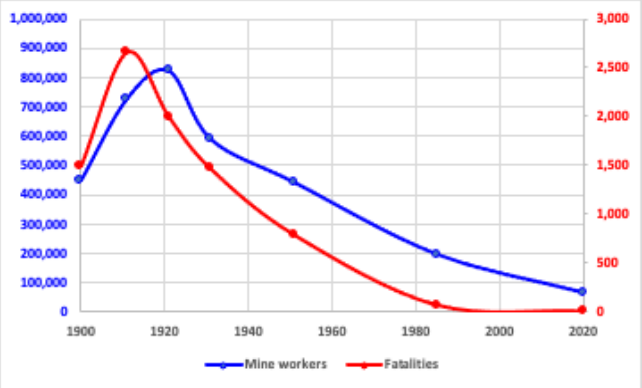


Figure 2 *Source data: arlweb.msha.gov*

Whilst still being too high, the decreasing trend in mining deaths above is attributable to the declining number of miners employed in mines and also the knowledge gained over the years, which has led to improved safety practices underground. It's also interesting to note that the dramatic fall in accidents in 1951 was not entirely due to less miners, or better safety legislation as this came much later in the USA, than in the UK. Protective safety legislation played no part in the UK until the mid-1800s and the major revisions in mining safety legislation came with the Mines & Quarries Act introduced in 1954, followed by the Health and Safety at Work Act which was passed in 1974. Both sets of legislation then began having a positive effect on safety. However, prior to this, some actions had begun with Factory Inspectors being introduced in 1833, followed by Mine Inspectors ten years later in 1843.

Mining would also go onto to experience seismic technical changes, having used wooden pit props for hundreds of years. The methods of using picks and shovels, then transferring the coal onto 15 cwt.(0.75t) tubs on rails, pulled underground to the pit shaft by pit ponies, would eventually go. The longwall coal faces produced by these methods were initially 60 feet long (18.3m) then extended to several hundred feet long, situated between two service roads or tunnels connecting directly to the pit shafts, then to the surface usually using a cage.

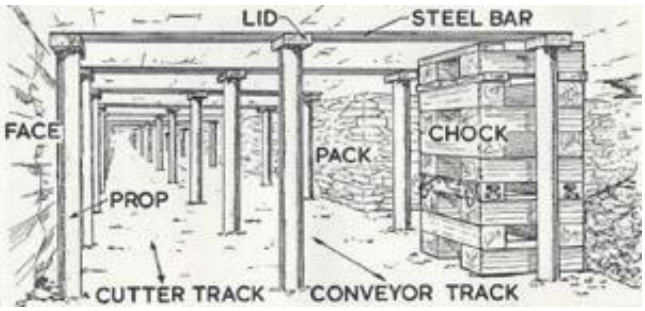


Figure 3 *Source: Dowty*

Later, pneumatic picks were used to hew coal, before the introduction of coal cutting machines, which under-cut coal seams by approximately 4 feet 6 inches (1.37m) and 6 inches (0.15m) in thickness allowing the coal above to be blasted out using explosives, which could then be loaded into the tubs. As the coal face progressed, the roof had to be supported every 3 feet (0.9m) for safety and access. Historically wooden pit props were used in rows along the longwall coal face at intervals of about 3-4 feet (0.9 – 1.2m) depending on the strength of the stone roof, safety and any dampness of the seam.

Figure 3 shows the method of support on a longwall face using wooden props and steel straps. As the coal face advanced, new rows of wooden props would be added and the rows furthest from the face would be manually removed, which meant the roof behind the coal face was allowed to fall – all in all a dangerous business! The last deep mine in Great Britain, Kellingley Colliery, which closed on 18 December 2015, is shown in ***Figure 4.***

The above article was reproduced with the kind permission of the Sir George Dowty Memorial Committee.

Figure 4 *Source: Dowty*

Running the mine from a mouse

Neil Battison/ Andy Birtles

Some years ago, Neil gave a presentation of the same name while he was Electrical Engineer at Daw Mill Colliery in the 2010s. Recent innovations, particularly those used in the Polish coal mining industry, have been included in this update of the presentation, following surveys undertaken by Andy during 2022 and 2023. This topic is as relevant now as it was then.

From ponies to mice - the modern coal mine

Source: N Battison

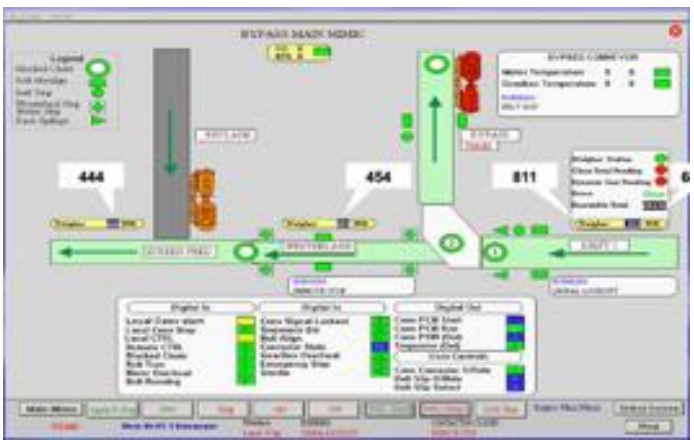
Mining has come a long way from the days of pit ponies and setting props and bars and 'hewing coal' with a pick and 'winning' the coal with a shovel. The modern mine has incredible amounts of 'electronic gadgetry', allowing management of all aspects of the mining process, from monitoring of gas, recording of seismic events, recording trends in bearing temperatures, determining the operation of rotating machinery, ensuring ventilation quantities and velocities are appropriate, and even for determining and restricting the location and quantity of personnel in a given area. It should be recalled, by those of us who worked in the mining industry during the time of 'King Coal', that mice were associated with ponies, and 'pit moggies' were found in many places underground, particularly where there might be a source of food and water. Terence Cuneo's paintings of industrial (including mining operations) generally included a mouse somewhere in the painting.

SCADA

SCADA is an acronym used extensively in the mining industry in the modern day, but generally we tend to misunderstand the real meaning. SCADA stands for Supervisory Control And Data Acquisition, which is a means of controlling, monitoring, and analysing industrial devices and processes. These systems consists of both software and hardware components and enables remote and on-site gathering of data from the industrial equipment, which can then be used by managers for making appropriate decisions.

Early days

In Neil's original presentation there was much discussion around the processes that could be monitored using the SCADA systems of the day. The focus was on machine and equipment performance and conditional monitoring, and three examples were given (which are still applicable). These included:



Source: N Battison

- Face Machine Automatic Speed Control, which focussed on the shearer cutting speed and the condition of the components within the shearer.
- Variable speed drives, and the interface with 'tripper' drives along conveyor belts, with the following advantages:
    - Lower belt tensions are required, resulting in minimal belt stretch on start-up as a result of controlled start-up torque

  - Belt is easier to handle in gate belt applications, with the potential for matching gate belt speed to face performance
  - Modular drive unit easy to dismantle and transport
  - Slow speed facility available for belt change and joint examination
- Delivery of coal via feeders into the Coal Handling and Preparation Plant, which focussed on the delivery of the coal at a controlled rate to optimise the efficiency of the process.

Current examples

The Polish coal mining industry is subject to 'natural hazards' (Zagrożenia Naturalne), which include:

- Methane gas
- Rock bursts
- Spontaneous combustion
- Gas and rock outbursts
- Water

Currently all of these can be monitored and the information can be used by management for decision making.

Many of the Polish coal mines have four control rooms, all using a development of the SCADA systems and processes. In this case there is the Zefir system (mainly for monitoring of the mine environment) and the Tauron system, for equipment and machinery. The inclusion of closed circuit television (CCTV) in key areas has also assisted in the monitoring and management of key points and areas of the process.

- The main control room, which displays the production parameters, can also access the displays from the other control rooms, and is usually adjacent to the dedicated incident control room, used by management and the Mining Authorities in the event of an incident or accident.
- The gas monitoring (ventilation) control room, which monitors methane, carbon monoxide, and in some instances oxygen. This control room also monitors temperature , which gives an indication of the development of spontaneous combustion.
- The rock burst monitoring control room, which collects and analyses data from several sensors located underground and on surface, and indicates the magnitude of any tremors (seismic events). Events registering an energy level above a certain threshold must be reported to the Mining Authorities.
- The engineering control room, which monitors the parameters of a range of equipment, from the winders, surface ventilation fans, conveyors, coal winning equipment (shearers, AFC drives, etc), power and substation operation, water pumping systems, fire water systems to name a few of the processes.

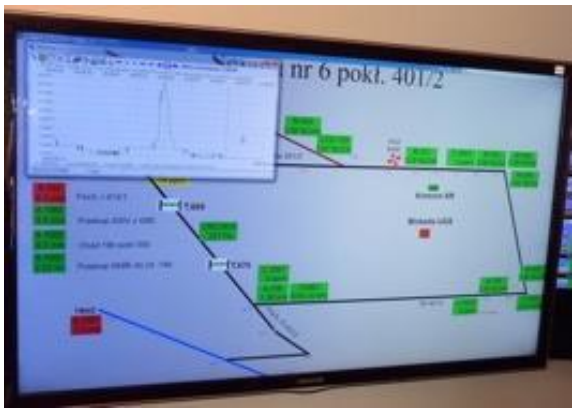
Security of the mining operation has benefitted greatly from the advances in CCTV systems. High resolution cameras can be installed in remote areas and monitor the activity around these areas and if any intervention is required.

An example of the gas and ventilation control room is shown on the next page, with the ventilation network (and all the monitoring points and status indicators (green for normal, amber for warning, red for alarm). As in Russia, it can be initially confusing when assessing the ventilation network, as a red arrow indicates fresh air, and blue indicates contaminated air (different to that used in the UK and South Africa). Indications of alarms (particularly CO from passing diesel locomotives) are closely monitored, and detail can be acquired at the 'click of a button'. It should be noted that the Mining Authorities, once a year, test the reaction of the mine to

Security control room *Source: A Birtles*

Ventilation control room *Source: A Birtles*

an emergency, and use the ventilation network to indicate the location of an 'imaginary' fire, and assess the emergency procedure process as the workforce are evacuated from the mine. The computer systems used indicate where the flow of smoke and contaminated air is likely to flow, and progress can be followed on the screen as to the extent of the contaminated air.



Longwall monitoring *Source: A Birtles*

Longwall faces are monitored for a variety of environmental parameters (e.g. temperature, methane, carbon monoxide, air flow, cooling equipment status, air door position etc.). This information can be easily accessed, as indicated in the image.

The methane drainage plant is monitored, and the concentration of the methane in the pipes and the pumps is also monitored, as is the concentration of methane in the building, with 'trips' built into the system should any concentration exceed a pre-programmed value. It should be noted here that all critical processes are fed power from at least two separate sources, so that in the event of one power supply being ineffective, a second supply is available. There is also battery back-up to ensure the monitoring systems remain effective.

Methane drainage monitoring *Source: A Birtles*

Ventilation fans are monitored for running and for moving part temperatures and vibration. This is displayed in the fan house (usually continually staffed) and also in the gas and ventilation control room and the main control room, with audible alarms in the event of any fault or change of status. Some of the fan stations have taken the monitoring to a higher level, with CCTV cameras, temperature, vibration, thermal imaging and induction motors being applied to ensure uninterrupted running of the fans as far as is practicable.

Engineering control rooms monitor all equipment and machinery component conditions, from conveyor drive bearings to the oil viscosity of the shearer gearbox. The engineering control room has access to all the monitoring undertaken, and is responsible for ensuring appropriate maintenance is undertaken when the monitoring indicates a declining condition. Any indication of substation failure, fan failure, winder failure, mining equipment failure is managed from the engineering control room, with interaction to the main control room if required.

Engineering control room *Source: A Birtles*

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Centre to train Mineral Resources specialists

Daniel Smith

Source: A N Birtles

A £2.6 million centre to train Mineral Resource specialists will be a multi-institution hub for doctoral training in estimating Mineral Resources.

The experts to enable the UK's transition to sustainable energy are to be trained by a consortium of academia and industry, led by the University of Leicester.

The Training and Research Group for Energy Transition Mineral Resources (TARGET) Centre's funding has been announced by the Natural Environment Research Council, part of UK Research and Innovation.

University of Leicester's Centre for Sustainable Resource Extraction will provide doctoral-level training in the full lifecycle of minerals from sector leaders.

The University says the TARGET Centre will combine PhD research projects with a multidisciplinary training programme to provide skills in mineral exploration, processing, finance, policy and sustainability at all stages of a mineral's use – from a rock in the ground to the end of a product's useful life.

The training is to be led by a mixture of academic researchers and industry practitioners, and the parentship of the centre is claimed to include some of the most important global companies in mining, mineral analysis, environmental standards, and finance.

TARGET's leader Dr Dan Smith, from the University of Leicester School of Geography, Geology and the Environment, says, 'TARGET is a really exciting opportunity for us to train a next generation of researchers with the skills they need to tackle some of the biggest challenges in mineral resources. How do they form? How can we find the raw materials we need? How can we process and extract them efficiently, and how can we be more sustainable whilst doing so?'

Find out more about how TARGET is recruiting its researchers, with the first intake from October 2024.

More information is available at the TARGET website.

Source: Anne Nygård/ Unsplash

Affiliated Local Societies' calendars of events

MTG Leadership

The following events have taken place or are currently planned for 2024. Additional information relating to Affiliated Local Societies can also be accessed from the IOM3 website.

WIMM

Meetings are generally held on the first Monday of the month at the William Smith Building of Keele University, usually commencing at 7:00 pm. The meetings/ lectures can also be attended using the Zoom application. Additional information can be accessed from the IOM3 website.

5 February 2024	The Modern Surveyor
4 March 2024	Compass Minerals - Winsford Salt Mine - Mine Shaft Upgrade Projects
22 April 2024	Review of UK Critical Minerals Strategy

MinSouth

Meetings are generally held on the second Thursday of the month at various venues, usually commencing at 7:00 pm. Registration prior to the event is required. Additional information can be accessed at minsouth.org.uk/.

8 February 2024	British Tunnelling Society MinSouth Joint Lecture		ICE 1 Great George Street London UK.
14 March 2024	Young Person's Lecture Competition	South Kensington, RSM building, London	
11 April 2024	Aberdeen Minerals Lecture	Counting House on Cornhill, London	
9 May 2024	Women in Mining UK – MinSouth Joint Lecture		IOM3, 297 Euston Road, London
18 May 2024	Ecton Mine Visit		
13 June 2024	MinSouth Prestige Lecture	IOM3, 297 Euston Road, London	

MIMinE

Meetings are generally held on the second Thursday of the month at one of the Mines Rescue Stations at Knottingley or Mansfield, with video conference facilities for those who cannot attend in person at the MRSs at Rhondda and Fife, usually commencing at 4:00 pm. Additional information can be accessed at www.themime.org.uk/events/

8 February 2024	Increasing continuous miners' availability at CPL
14 March 2024	Cost benefit analysis of using electronic detonators in a large carboniferous limestone quarry in the north of England
9 May 2024	Dealing with natural hazards in Poland

Other events are at various venues:

21 February 2024	Young Person's Lecture Competition	Devonshire Hall
12 April 2024	Conference/Seminar SAFETY SEMINAR 2024	Crowne Plaza, Sheffield (registration details on the IOM3 website and MIMinE website)
9 May 2024	General Meeting	
11 October 2024	AGM, Dinner and Presidential Address	Mount Pleasant, Doncaster

NEIMME

Meetings are generally held on the second Thursday of the month at Neville Hall in Newcastle upon Tyne, with video conference facilities available for those who cannot attend, commencing at 6:00 pm. Additional information can be accessed at mininginstitute.org.uk/.

18 January 2024	The Launch event for the 'Willington Railway'
15 February 2024	A Geological Ramble Through Saudi Arabia
14 March 2024	Offshore Renewable Energy - Past, Present and Future
26 April 2024	Symposium and 171st Anniversary Celebratory Dinner

Other dates are still to be announced.

MIS

Meetings are generally held on the second Tuesday of the month, with video conference facilities for those who cannot attend available, commencing at 7:00 pm. Additional information can be accessed on the IOM3 website.

14 February 2024	Managing coal mining legacy hazards – the role of The Coal Authority
12 March 2024	Goal Setting Health and Safety Legislation and its Application in the Extractive Industries
20 March 2024	Norman Henderson Memorial Lecture - Discovering our full potential: The beauty of interconnected natural resource ecosystems
10 April 2024	Green hydrogen energy systems in Scotland – lessons learnt through the consenting process

CorIE

Meetings are generally held at the Chapel Lecture Theatre, Penryn Campus, Penryn, Cornwall, with video conference facilities for those who cannot attend available, commencing at 6:00 pm. Additional information can be accessed on the IOM3 website.

25 January 2024	'Radon - a problem for one and all'
8 February 2024	Carbon and Costs - The Impact of Blast Design
22 February 2024	The Old and the New: Sci/Ionian Ill - Sci/Ionian IV New Design
7 March 2024	Dewatering of Crofty Mine
11 April 2024	Structural Engineering in Non-Routine Marine and Subsea Operations

Get involved

Colin Comberbach

The MTG is actively seeking IOM3 member volunteers to join the Leadership Team. We are looking for members at any stages in their careers, particularly early-mid career and those who can bring new ideas and, just as important, be prepared to get involved, do things and make things happen. For more information, visit our MTG web page on the IOM3 website or check out the spotlight article on the Mining Technology Group in the November 2023 edition of Materials World. If you have any questions about becoming a team member or would like to know more then make contact with me, the MTG Chair by email to our dedicated email address mtg@iom3.org.

At the MTG we would also appreciate if you could contribute to what we do or suggest ways that we can improve the website, the communication to and from affiliated members, the events that are organised, and of course you are welcome to contribute an article to this Newsletter. Let us know of your involvement in the mining sector, share your views or describe how you might contribute in some way to MTG activities (email mtg@iom3.org).

Volunteer applications are considered by IOM3 on an ongoing basis and we are happy to arrange informal conversations for anyone who wants to find out more about the opportunities. We look forward to hearing from you and hopefully welcoming you to our body of enthusiastic volunteers! Additional information can be accessed from the IOM3 website.

Ground Engineering Subgroup (GES) Activities

Emily Wood

The Ground Engineering Subgroup (GES) of the Mining Technology Group would like to take this opportunity to reflect on our achievements in 2023 and the opportunities and goals for 2024.

Summary of 2023:

- GES sent out a call for expressions of interest in ground engineering within the IOM3 community.
- GES supported the 11th International Ground Freezing Symposium https://www.iom3.org/events-awards/11th-international-symposium-on-ground-freezing/conference-resources.html
- GES Published articles in Materials World to raise the profile of ground engineering in IOM3. Find some of them here :-
    - https://www.iom3.org/resource/mining-for-usable-space.html
    - https://www.iom3.org/resource/in-the-field-engineering-on-harsh-ground.html
    - https://www.iom3.org/resource/iom3-investigates-ground-freezing.html

Looking forward to 2024:

- With the excellent response to the GES expression of interest we hope to build on this in the coming year with opportunities to contribute
- Looking forward to the launch of the first GES webinar
- Further articles in Materials World promoting ground engineering
- Continue to work towards technical community group status for GES
- Increasing the size of the GES committee

The GES committee is confident that with our collective efforts and determination, we will make 2024 a successful and fulfilling year for GES. Please continue to spread the word.

If you wish to hear more or get involved please contact:

David Waring (Chair), david.waring@uk.bp.com

Iain McKechnie (Vice Chair), iain.mckechnie@bam.com

Emily Wood (Secretary), emily.wood@bam.com

PERC News

Andy Birtles

IOM3 Members who have influenced PERC

The Pan European Reserves and Resources Reporting Committee (PERC) and IOM3 would like to take this opportunity to thank Stephen Henley and Neil Wells for their contribution to CRIRSCO, PERC and IOM3 over the many years of their involvement on the PERC Executive Committee, and also to congratulate them on their 'retirement'.

Other members who have also contributed significantly include the following:

- Ruth Allington
- Gordon Riddler
- John Clifford

PERC Chairperson's mid-term report, February 2024

Edmund (Ed) Sides, the PERC Chairperson, has issued his mid-term report on PERC's activities for the period since the PERC AGM in April 2023 up to the end of 2023. This is now available via the PERC website.

The report includes details of meetings, training courses and presentations related to raising awareness and knowledge about PERC and CRIRSCO. Some of the key outcomes of the CRIRSCO AGM, which was held in Rio de Janeiro in October 2023, are summarised. Some changes to the CRIRSCO standard definitions were agreed at the AGM together with the approval of a final draft of the updated version of the CRIRSCO Template to UNFC Bridging Document, and an accompanying Guidance Note on its usage.

Ed was appointed as Deputy Chair of CRIRSCO with effect from 1 January 2024. This is an important recognition of PERC's contributions to the work of CRIRSCO and will provide an opportunity to further raise awareness about PERC and CRIRSCO within Europe.

New IOM3 representatives

PERC and IOM3 are pleased to announce the appointment of Liz de Klerk as a new IOM3 representative on PERC to fill the vacancy left when Neil Wells stepped down earlier this year. Liz is a geologist by training and her knowledge will complement that of the other three IOM3 representatives which cover Mining (Andy Birtles), Metallurgy (Andy Carter) and ESG aspects (Fiona Cessford).

James MacFarlane has also become part of the IOM3/ PERC 'family', and will be assisting in promoting the PERC Standard to the various financial institutions and bourses in the UK and in Europe.

IOM3 PERC Advisory Group

Following the appointment of a full complement of IOM3 representatives on PERC, IOM3 has set up a 'PERC Advisory Group' to help the representatives get a fuller picture from the relevant parts of IOM3 membership, somewhere to get wider expertise and also a way of disseminating any information from meetings relevant to the two organisations. Alongside the four PERC representatives and IOM3 team, representatives from each of the extractives groups, Applied Earth Sciences, Mineral Processing and Extractive Metallurgy and Mining Technology are invited. The inaugural meeting of this group occurred on 28 February this year.

The CRIRSCO Template to UNFC Bridging Document

PERC is pleased to announce that a webinar, titled 'The CRIRSCO Template to UNFC Bridging Document Update 2024', was presented by EurGeol Dr Edmund Sides PGeo, currently Deputy Chair of CRIRSCO and Chairperson of PERC. His presentation covered the following topics:

- An overview of what CRIRSCO, PERC, UNECE and the EGRM are
- The relationship between the CRIRSCO Template and UNFC
- The 2024 CRIRSCO Template to UNFC Bridging Document Update
- Guidance Note on its use (a new joint CRIRSCO-UNECE document)
- Concluding Remarks
- References

The Zoom webinar was presented on 13 and 14 February and a pdf version of the slide presentation will be made available to registrants after the sessions have been completed.

Training

An online training course entitled 'An Introduction to the CRIRSCO Family of Reporting Codes' was given every Thursday afternoon from 1 February to 21 March. This course consisted of eight modules encompassing 'Competency', Public Reports, 'Modifying Factors', the CRIRSCO-UNFC Bridging Document, the use of Table 1 and the reporting of risk or uncertainty. Full details about the course are given on the GSL website.

Future conferences

Colin Comberbach

MTG 2025: Advances in Mining Technology & Mineral Supply

Source: IOM3

The MTG is pleased to announce the date and venue for its 2025 conference:

IET Austin Court, Birmingham, 19-20 March 2025.

This followed an intensive review of venues in conjunction with the IOM3 Events team. It was decided to take the event outside of London for reasons of wider accessibility, lower delegate rates and overall value for money.

The conference will explore advances in technology, including artificial intelligence, at every step of the mining lifecycle and examine their interactions with strategic mineral supply to meet future demands for downstream materials.

Last year we reached out to members for feedback on the scope of the event. The findings are being utilised to help shape the conference to deliver the best outcome for participants. The first call for papers is expected to go out in early April 2024, including:

1. Content of the Conference

Outline of topics and themes.

2. Request for Speakers and Papers

Timetable for submitting presentations and published papers.

3. AI Training or Demo Sessions

We are still striving to make Artificial Intelligence one of the central themes of the conference and have made good progress with one or two organisations willing to provide AI training sessions or demos related to mining technology. Please let us know if you would like to join this educational opportunity at mtg@iom3.org.

4. Potential Sponsors or Exhibitors

Invitation for organisations interested in sponsoring or exhibiting at the conference.

Further information and updates about MTG 2025 will appear in due course on a new IOM3 webpage for the conference.

International Geological Congress 2028

The International Geological Congress takes place every four years at different global locations, bringing together thousands of geoscientists.

The community of earth scientists in the UK is aiming to bring the 38th Congress to Glasgow in 2028. They are seeking to create an event of global significance that places Earth Science at the heart of solutions to meet the major challenges facing societies around the World. The team is reaching out to science communities to support the bid for the conference.

If you would like to help Glasgow win the competition to host the 38th International Geological Congress, then the bid team would welcome a letter of support from you that can be included in the bid proposal. Details can be obtained from Professor David Manning at the University of Newcastle, or from Dr Marissa Lo, Assistant Editor at the Geoscientist Magazine.

Mining Education Matters

Darron Dixon-Hardy

Education & training update

Source: Immersive Minds

The UK Mining Education Forum (UKMEF ukmef.org.uk/) was established in 2021 to bring together key stakeholders from mine operators, the mining supply chain, health and safety executives and academia to provide a platform to collaborate, maintain and develop mining (defined as the extraction and procession of minerals) education in the UK. The provision of education in mining has been in long decline and the UKMEF has already made significant progress in improving awareness and acknowledging what challenges are facing the mining industry. It is considering the formation of a Board or Council to more formalise its activities and until it does it continues to receive considerable support from ABMEC (the Association of British Mining Equipment Companies) and several IOM3 Affiliated Local Societies. Other organisations such as The Mining Association of the UK (MAUK), the Mineral Products Qualifications Council (MPQC) and the IOM3 Memorandum of Understanding (MOU) with Minerals Matter are active in transforming mining education and training provision in the UK and as such contribute to the UKMEF aims.

IOM3 has been engaged with schools outreach activity for a number of years with Dr Diane Aston, Head of Education & Professional Development, and her team providing materials for schools but it's worth bearing in mind the pressure that schools have to deliver their curriculum and the demand for time that external organisations are competing for in this arena. The UK's mining museums recognise the value of the nation's mining heritage and are developing materials and activities to entice young people to learn about the mining industry. While heritage is a good starting point opportunities are being made to increase awareness of how important the contribution of mining is, not just for the products we need now and are accustomed to using but for future demands, perhaps the most obvious of which is batteries for electric vehicles.

At the most recent UKMEF meeting in February 2024 the National Mining Museum Scotland (NMMS nationalminingmuseum.com) gave a short summary of its range of in-person and digital education programmes. Education at NMMS reaches numerous audiences including schools (nursery, primary, secondary and higher education), families, and communities. In 2023-2024 the Museum had over 1,300 educational visitors, plus an additional 300 people were engaged through educational outreach projects. Its aim is to make Scotland's mining heritage relevant to everyone, in addition to engaging in current and recent energy and mining developments.

Source: National Mining Museum Scotland

Lastly the news from the Camborne School of Mines (CSM) is the undergraduate BEng/ MEng degree in Mining Engineering might be resurrected for the 2026 academic year, subject to sufficient interest and applications from potential students. At the moment Masters courses are still running at CSM and conversion courses remain available. Let's remember that mining provides great opportunities and a great career, there's something in the mining industry for everyone.

Jonny Witter & Shane McQuillan

Mine Tech Services

IOM3 education and integration - recruiting the next generation of mining professionals

Mine Tech Services (MTS) is a mining consultancy focused on helping operations improve efficiency and sustainability by leveraging technology. The company's goal is to bridge the gap between data and mining and help operations use this to answer their most challenging questions. With this in mind, MTS also recognises the impending employment crisis facing the mining industry and is proactive in outreach to support students interested in pursuing a career in the mining industry. This article discusses some of the actions MTS are taking to tackle this.

One avenue MTS has successfully recruited through is at a university level, by forming relationships with universities providing traditional mining courses, like the University of Exeter (Camborne School of Mines (CSM)). The team recently hosted a Pint and Pasty event at CSM, intending to provide insight into a specialised area of the industry that perhaps students were not initially aware of. The event consisted of a talk on 'What does a 21st Century Mining Consultant Look Like?', followed by some pints and pasties in the bar, giving MTS and the CSM students excellent opportunities to network and learn. There was great engagement from students across a range of years and disciplines, with a keen interest in how technology is changing the mining industry and what to expect from a career in the industry.

An alternative approach we have taken is exploring non-traditional pathways for people to enter the mining industry, mainly focused on I.T. and technology. We are very proud that our team is a mix of people with experience in mining and those who are entirely new to the industry. This blend has been brought about by recruiting for technical roles in areas like data engineering and business intelligence from non-mining backgrounds. The skills and knowledge requirements of the industry have then been shared by those with extensive experience in the industry, to provide a good baseline from which to develop their career. As mining becomes more technology-focused, data and computer science courses in colleges could be tapped into further as a potential resource for the sector.

MTS at CSM Pint and Pasty Event. *Credit: Mine Tech Services*

We recently launched our MTS graduate scheme to support the above two avenues. This programme is structured to bring graduates up to speed with the skills required to become a consultant in the mining industry. The six-month programme focuses on various topics to help students get up to speed with the latest industry trends.

A final method MTS uses to attract talent is student placements and projects. We have a well-established relationship with Lancaster University and have supported several Masters and PhD students from their data science department with projects. In the past, our projects have looked at improving sustainability and efficiency on the mine site through optimal gear selection and payload placement. Students are especially keen to apply their skills to help the industry tackle some of its sustainability challenges.

MTS will continue to use its unique position in the industry to attract talent that otherwise might need to be made aware of the fantastic opportunities mining can provide.

More information can be found at minetechservices.com.